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Foresight Exploratory Workshop

Blueprint
U.S. Foresight Study

Developed by
US/UK
Foresight Team

Washington, DC
19 September 2008

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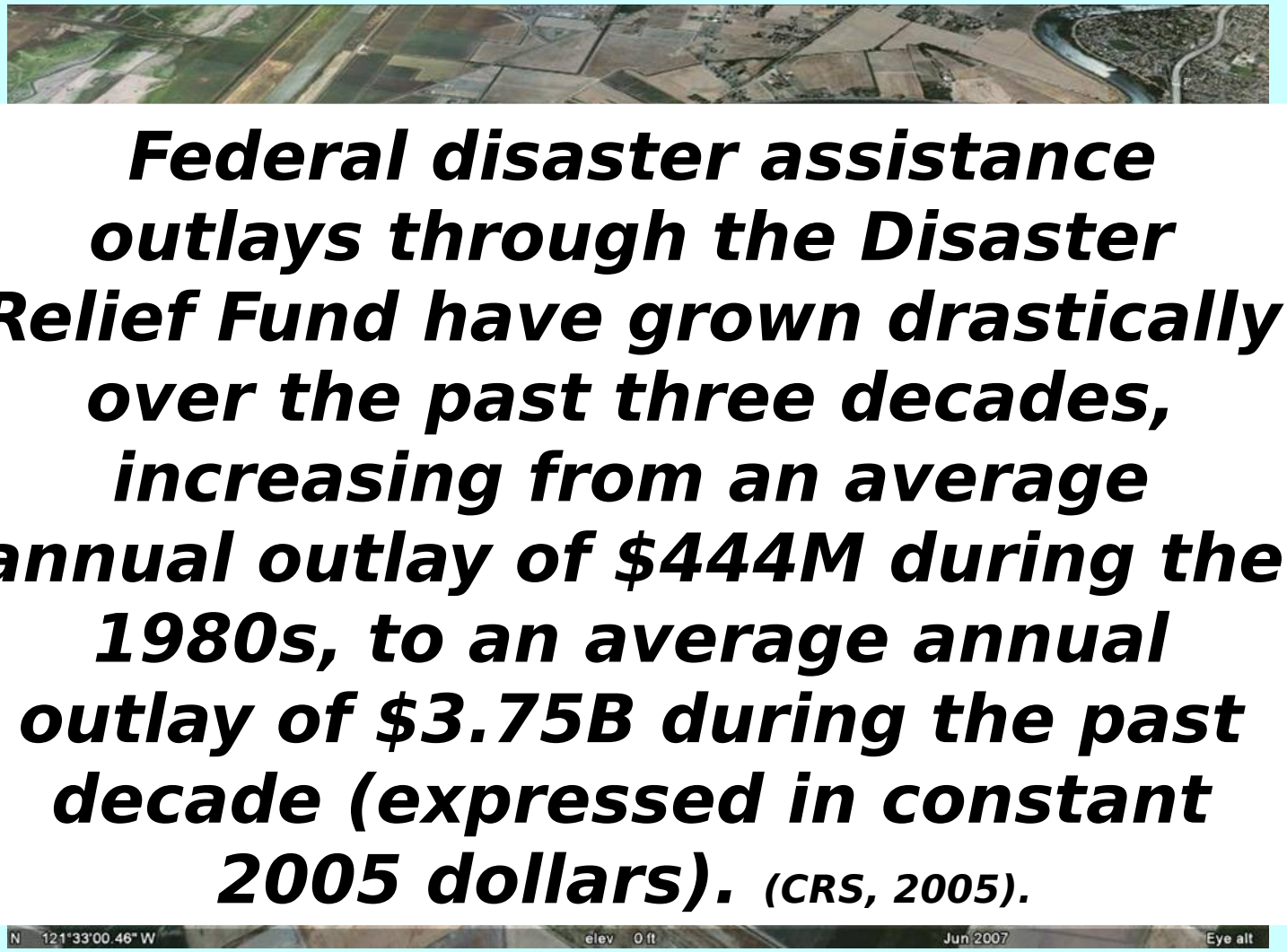
Flood Risk = f(probability, consequences)



Federal disaster assistance outlays through the Disaster Relief Fund have grown drastically over the past three decades, increasing from an average annual outlay of $444M during the 1980s, to an average annual outlay of $3.75B during the past decade (expressed in constant 2005 dollars). ***(CRS, 2005).***

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Foresight Flood and Coastal Defence

- It is a structured framework which considers four science based scenarios of socioeconomic development and climate change to “provide an indication of future risks from flooding and coastal erosion.”
- It looks at the next 30 to 100 years, “quantifying the possible scale of the challenges and providing a broad assessment of the different measures available to reduce risk.”

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Foresight
Flood and Coastal Defence

- It considered two questions:
  - How might the risks of flooding and coastal erosion change in the UK over the next 100 years?
  - What are the best options for Government and the private sector for responding to the future challenges?
- It yielded two key messages:
  - Continuing with existing policies is not an option—in virtually every scenario, the risks grow to levels determined to be unacceptable.
  - Risk needs to be dealt with on a broad front —“we must either invest more in sustainable approaches to flood and coastal management or learn to live with increased flooding.”

Evidence into action

Making space for water
Taking forward a new Government strategy for flood and coastal erosion risk management in England
March 2005
FORESIGHT
Future Flooding
Executive Summ
Flood and coastal erosion risk management (FCERM) planning
Policy 35_06
Issued 01/08/08
Policy statement
Our policy is to adopt a strategic approach to flood and
Communities and Local Government
Planning shapes the places where people live and work and the country we live in. It plays a key role in supporting the Government's wider economic, social and environmental objectives and for sustainable communities.
Taihu Basin
floods
Thames Estuary 2100
The Pitt Review
PLANNING
Planning Policy Statement 25:
Development and Flood Risk
December 2006

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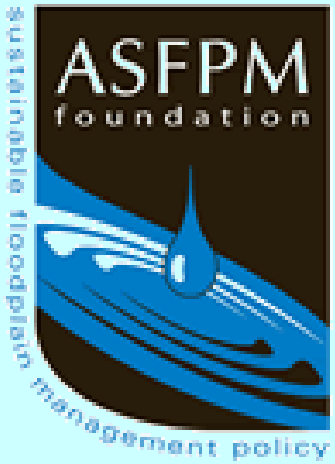
Floodplain Management 2050
The 2nd Gilbert F. White Flood Policy Forum

Project Foresight Workshop

September 18, 2008

Washington DC



Doug Plasencia, P.E., CFM

ASFPM Foundation Events Chair

FPM 2050- Summary Points

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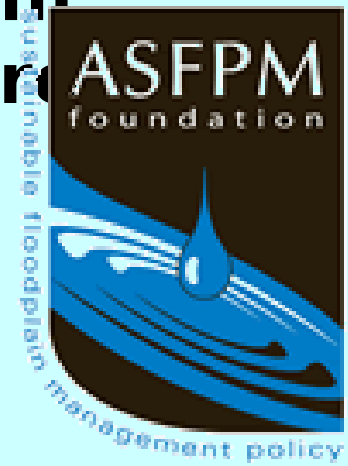
1. **The U.S. is facing unprecedented change, increasing flood risk, and loss of natural systems**
2. **Gilbert F. Whites "Human Adjustment Factors" are still relevant but require expansion**
   1. ***Room for rivers and oceans.***
   2. ***Personal responsibility***
   3. ***Geographic interdependencies***
   4. ***Awareness and education***
3. **There is a real need to evaluate U.S. risk and modify policy to meet the demands of 2050**



Flood Risk Management Program

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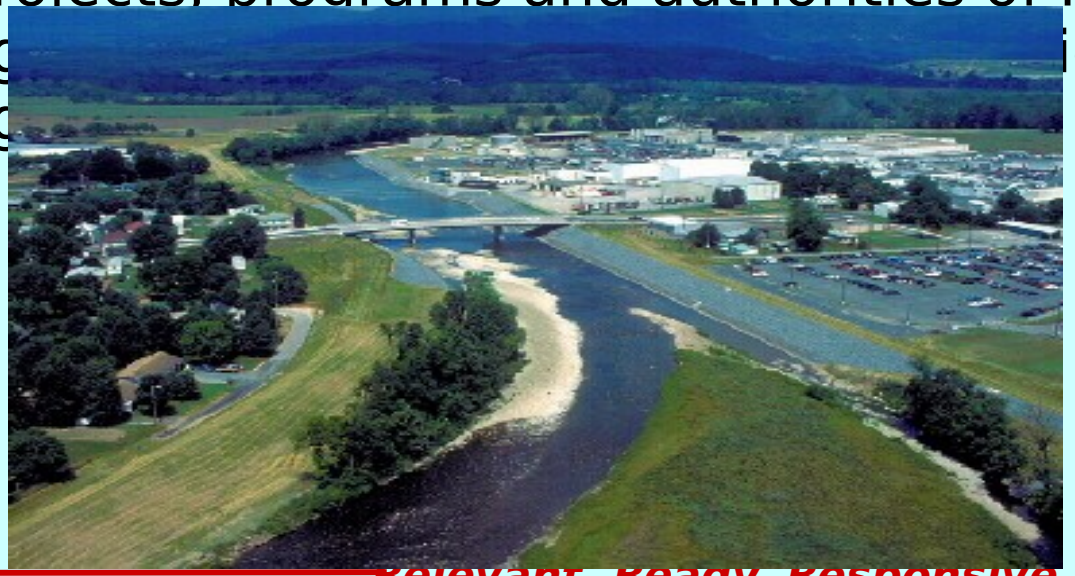
Vision: To lead collaborative, comprehensive and sustainable national flood risk management to improve public safety and reduce flood damages to our country.

Mission: To integrate and synchronize the ongoing, diverse flood risk management projects, programs and authorities of the US Army Corps of Engineers with counterpart projects, programs and authorities of FEMA, other Federal ag ional and local ag



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2008 appropriations Act

- The Energy and Water Development and Related Agencies Appropriations Act, 2008 requires a study to identify any procedural or legislative changes that may be warranted to allow the Corps of Engineers to be more effective in working with other Federal agencies, states and local governments and stakeholders in the management of flood risk.

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Water Resources Development Act of 2007 Section 2032

… the President shall submit to Congress a report describing the vulnerability to damage from flooding, including the risk to human life; the risk to property; and the comparative risks faced by different regions of the United States.

…the report shall include an assessment of the flood risk reduction programs; the extent to which those programs may be encouraging development and economic activity in flood-prone areas; recommendations for improving those programs with respect to reducing and responding to flood risks; and proposals for implementing the recommendations.

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Blueprint US Foresight Discussion Scoping Document

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Purpose

- Describe flood risk nationally and develop base line conditions
- Generate a vision of future scenarios of the national flood risks in 2050-2100
- Develop options that respond to the future scenarios
- Present the results to key decision makers, policy makers, professionals, stakeholders and the public

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Project Criteria

- Value added
  - To the nation
  - Study cost must be justified
- Intergovernmental
  - Considers all government agencies with FRM nexus
- Durable
  - Long useful life
  - Easy to update
- Aligned
  - Strategic plan
- Coordinated
  - Administration
  - Congress
- Collaborative
  - Partners and Stakeholders
  - Externally
- Cost effective
  - Assessment commensurate with the required detail of output
- Timely
  - Leverage the present visibility of flooding
- Credibility
  - Impartial
  - Objective
  - Authoritative
- Visionary
  - Innovative thinking

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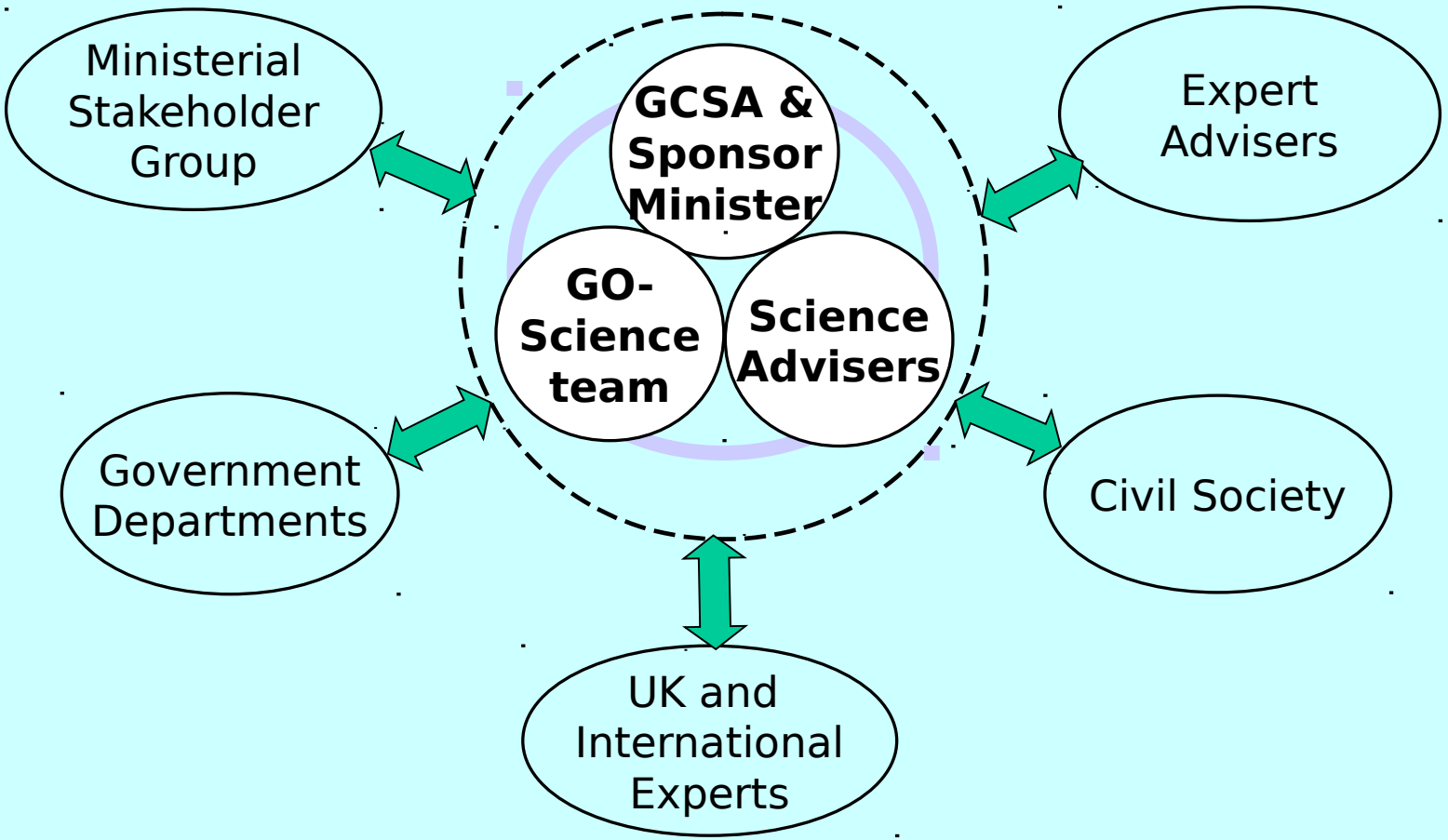
UK Project contributors



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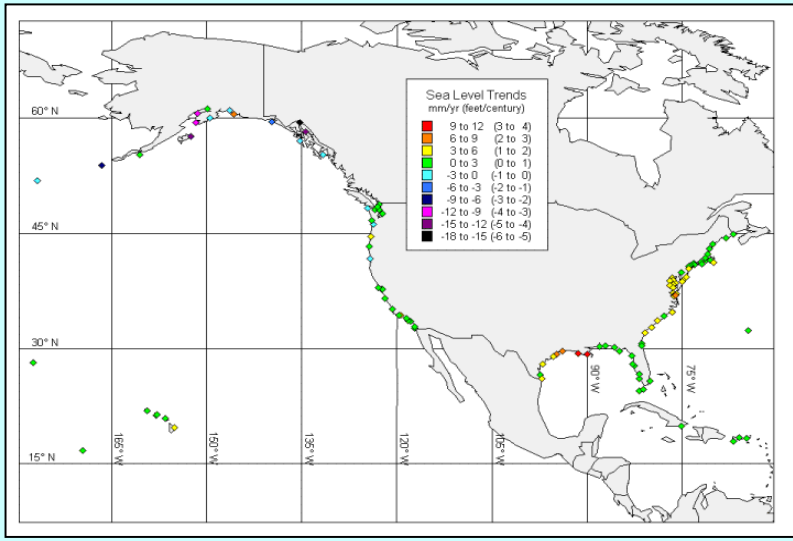
Socioeconomic and Climate Change

Fundamental basis of study

- US society is changing :
  - Population
  - Economy
  - Regional variation (e.g., greatest changes in South and West)
- Climate and large-scale environmental changes that impact flood risk are occurring:
  - Land uplift (e.g., Alaska)
  - Subsidence (e.g., Gulf Coast)
  - Land cover
  - Seismicity



Source: US Climate Change Science Program, Product 2.1b, July 2007

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Scenarios

- Universally accepted for futures analysis, embracing possible changes across a range of domains
- Are used to develop an internally consistent and coherent set of possible futures (NOT a forecast)
- Especially useful when consequences are high and uncertainties are poorly characterized
- Provide basis of comparison with the current situation (baseline) to inform decision-making
- The whole team is working to the same benchmarks
- They assist communication of complex issues of change to a wide audience of stakeholders

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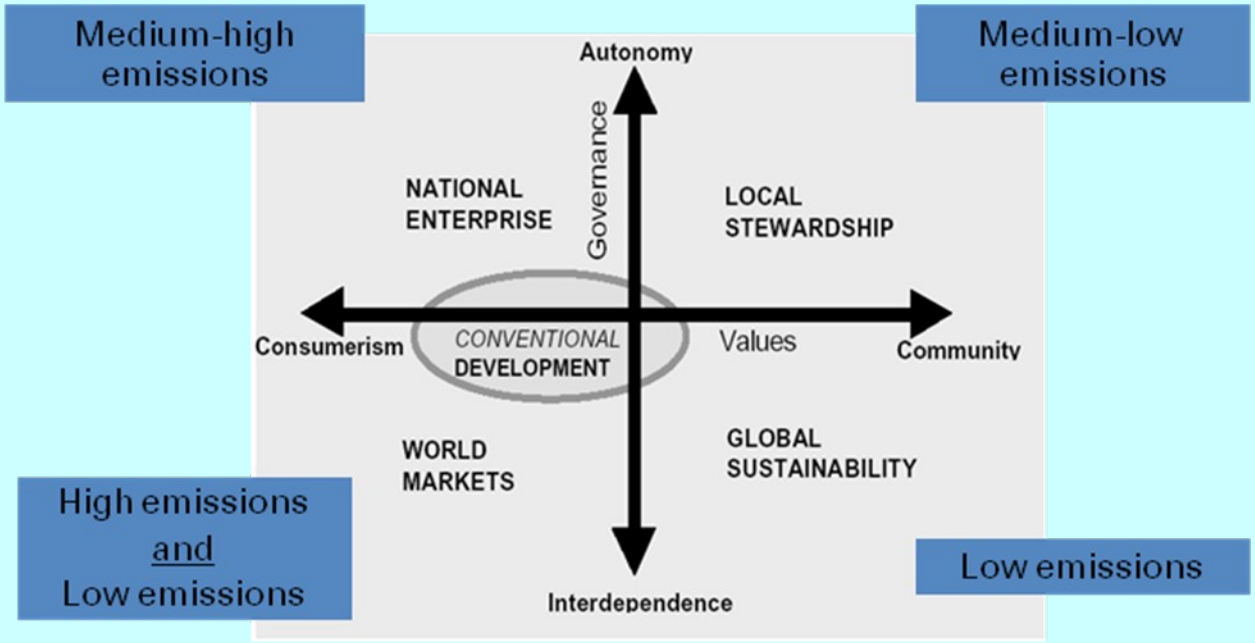
Approach

- **Review Futures Work**
- **Select Key Dimensions**
- **Group/Classify a small number of scenarios**
- **Independent Dynamic Review by Partners and Stakeholders**



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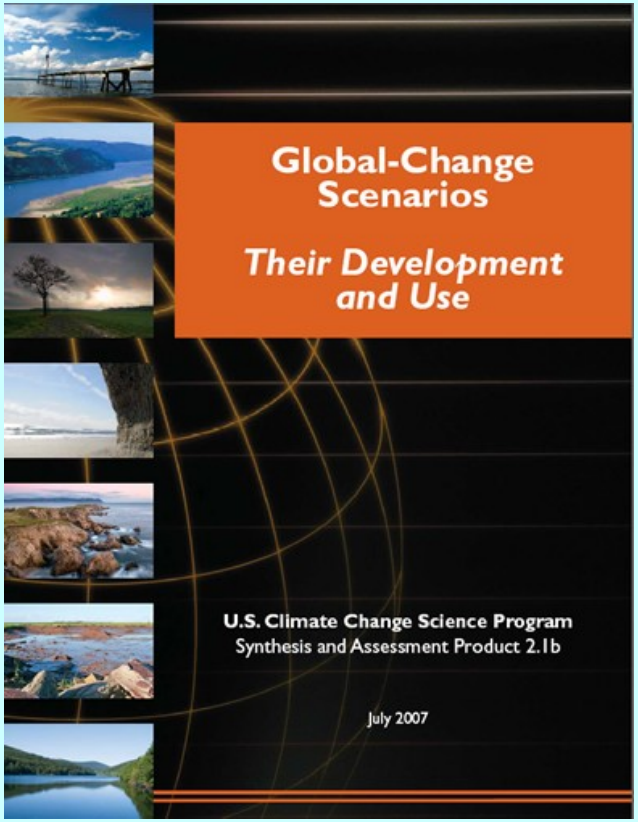
Scenarios

- A framework and a discipline for qualitative analysis
- A structure to drive and constrain quantitative analysis and modelling
- A method for reporting complex results in a coherent and accessible manner



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Socio-Economic Scenarios Data Sources

- Nationally available peer reviewed data and existing scenario analyses, as appropriate, such as:
  - National census data
  - National property distribution
  - US Climate Change Science Program Product 2.1b

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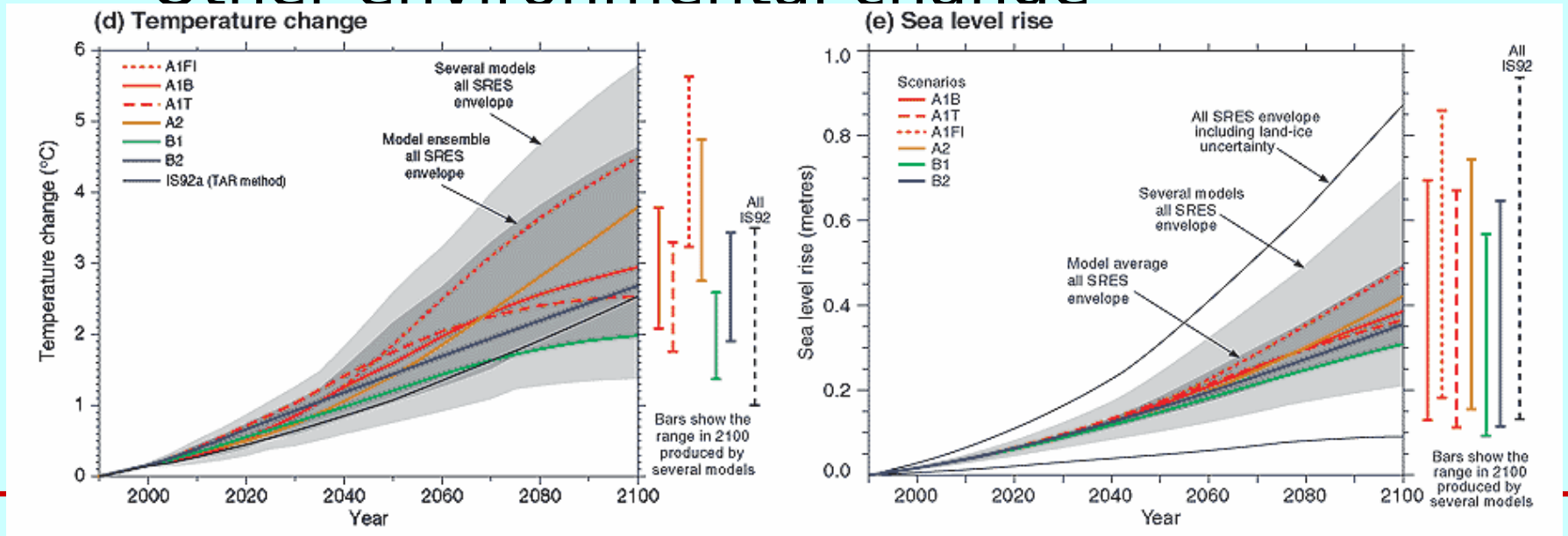
Climate and Environmental Change Scenarios: Data Sources

Uses existing data and analysis

- IPCC Fourth Assessment Report
- National US climate analyses
- Other environmental change



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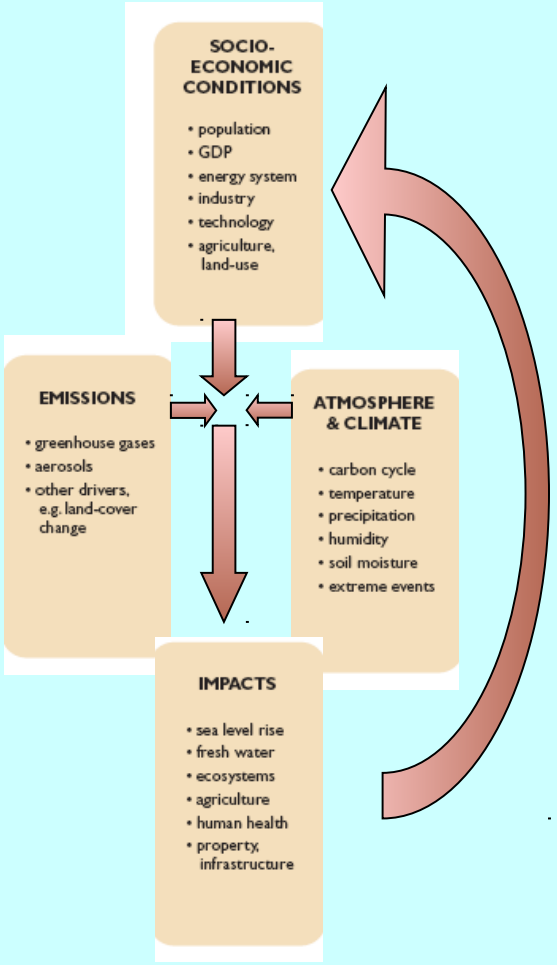
Scenario Synthesis

- **Run the impact model across all the scenarios for selected impact metrics**
- **Explore the range of possible changes (a cloud of possible future impacts)**
- **With external partners and stakeholders, select results that illustrate the full range of impact space**
- **Unpack the storyline behind each of the selected results**



Simplified causal chain (after CCSP 2007)

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Expert assessment

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Objectives and value of outcomes

- Identify the conceptual model for the flood risk system and the sets of drivers and potential measures which could change the system.
- Detailed description of all drivers and measures
- Cause-effect diagrams of driver and measure interactions
- Assessment of driver and measure impacts on future flood risk
- Generation of relative ranking of drivers and measures
- Identification and scoring of sustainability of measures

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Data resources and approach

- Required data are available; data selection is critical
- In order to achieve buy-in, experts must be selected from across the relevant partners and stakeholders (federal state & local agencies, private, academia, NGOs)
- Experts will be selected on the basis of their esteem, skill-diversity, technical, geographical experience and knowledge and ability to envision system change
- May require supporting subgroups e.g. to elicit specialist knowledge and cover geographical variation
- Dynamic peer review is required at each step and this may trigger inclusion of additional experts where necessary

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How we will do it?

- Formal and agreed procedures of expert elicitation
- Requires combination of individual activity and workshops at which consensus (buy-in) is achieved
  - Specialist subgroups may need to hold workshops to deal with topic/ geographical issues
- Agreement on risk metrics
- Interaction with quantitative analysis :
  - Provides estimated potential changes in the variables for use in quantitative model
  - Compares with results of sensitivity analysis to identify influential drivers for comparison with expert estimates
- Working to a strict timetable is essential and helps to maintain the energy and focus of the study

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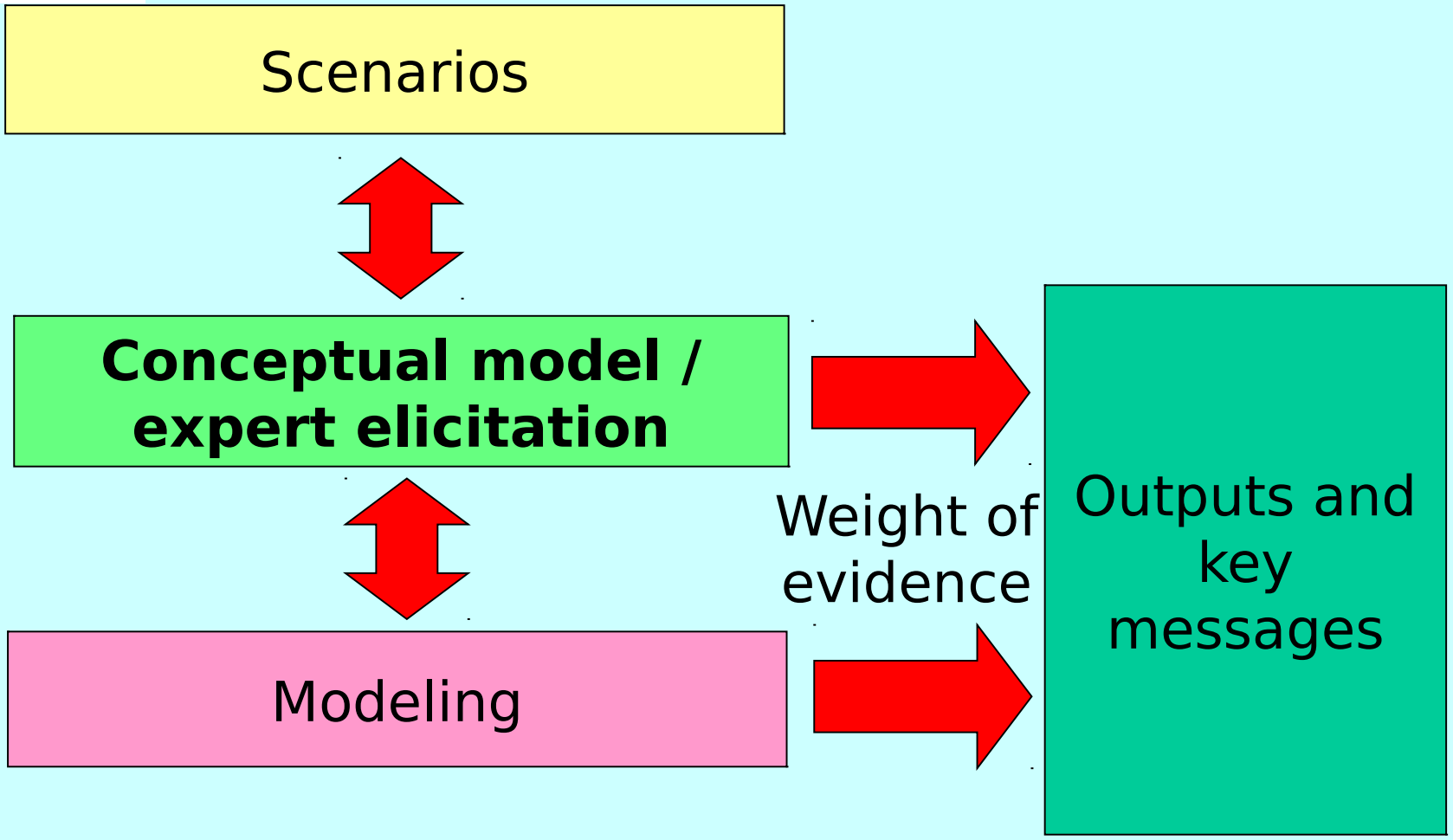
Outputs and high level messages

1. Conceptual model of the flood risk system (source-pathway-receptor)
2. Shared understanding of drivers, how they interact and their relative importance (ranking)
3. Shared understanding of flood risk reduction measures, how they interact and their relative importance (ranking)
4. Helps to generate consensus on the problem and assist in structured deliberation on the potential and sustainability of future alternative portfolios of management measures

Conceptual Framework



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Flood Risk Modeling

Objectives

- To provide a national-scale view of flood risk
- To quantify how flood risk may vary under scenarios of future change (2050s, 2100)
- To quantify the potential effectiveness of policy alternatives for flood risk management

Value

- Understand the quantified scale of the problem
- Support Water Resources Act 2007, Section 2032
- Differentiate high risk from low risk
- Help identify the emerging sources of

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Approach and data

A national broad scale method for flood risk assessment, incorporating:

- Probability of flooding
- Spatial extent of floods
- Flood damage

National representation of:

- River flooding
- Coastal flooding

Baseline analysis for present day; simulate variables to represent future changes

Uses available digital national datasets e.g.:

- Floodplain maps (FEMA)
- Digital elevation models
- Flood frequency and rating curves (USGS)
- People and properties (census, HAZUS)

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How we will do it

1. Interact with qualitative assessment to identify relevant flooding processes, drivers and measures to be represented
2. Scope available datasets
3. Establish national flood risk assessment method
4. Establish method for incorporating drivers of change and flood risk management measures
5. Pilot on selected region(s)
6. Validate against results from existing studies and losses for flood incidents
7. Apply to whole of USA for base line analysis
8. Explore future scenarios and flood risk management responses

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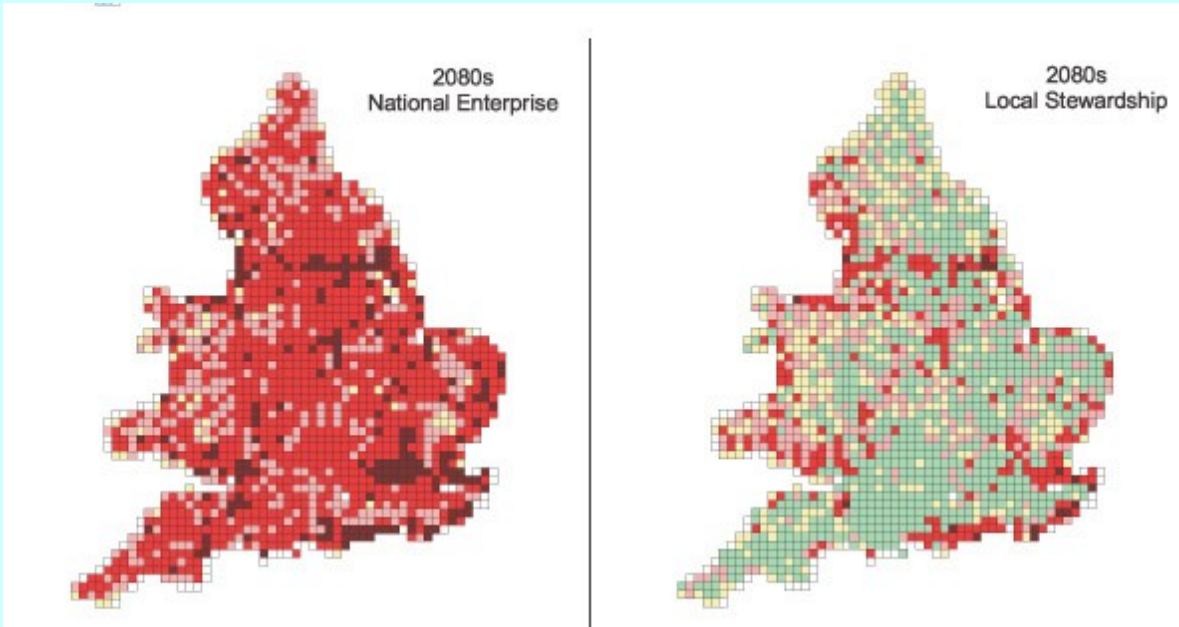
Examples of Outputs

- Expected Annual Damages (economic)
- Numbers of people/properties at risk (disaggregated for different population sectors)
- Insured losses, for given insurance scenarios

Outputs disaggregated regionally, according to flooding processes

... for a present day baseline and future scenarios



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High level messages

- What is the magnitude of flood risk on a national scale and where are the hot spots?
- How might climate and socio-economic change influence flood risk on a national scale?
- How effective are alternative policies for flood risk reduction and what are the benefits?

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Next Steps

- Convert discussion document to a scoping document, including draft governance and program structure
- Vet internally
- Establish external partners
- Seek Administration support and direction to move forward

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Questions or Comments?